Title: Games, Games, Games

Brief Overview:

The following activities are a cross-curricular unit between Mathematics, Science, and Language Arts classes. Students will create a math board game that focuses on fractions, decimals, and percents and their interrelationship. Students also will be able to share their games with members of the student body.

*Note to teachers: This unit can be easily adapted to any unit of study.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

Number and Operations

Students will demonstrate their ability to represent and show relationships between decimals, fractions, and percents. They will demonstrate their ability to communicate mathematically how decimals, fractions, and percents are interrelated. Students also will be able to use estimation and computational skills with decimals, fractions, and percents.

- **Process Standards**

Mathematics as Problem Solving, Reasoning and Proof, Communication, Connections, and Representation

These five process standards are threads that integrate throughout the unit, although they may not be specifically addressed in the unit. They emphasize the need to help students develop the processes that are the major means for doing mathematics, thinking about mathematics, understanding mathematics, and communicating mathematics.

Links to MSDE Reading Learning Outcomes:

- **Reading to be Informed**
  Students will demonstrate their ability to construct, extend, and examine meaning for a variety of texts by using strategic behavior and integrating both their prior knowledge about reading and topic familiarity.

Links to MSDE Writing Learning Outcomes:

- **Writing to Inform**
  Students will demonstrate the ability to write effectively to inform by developing and organizing facts to convey information. In this way, students will create meaning for themselves and others.

Links to MSDE Science Outcomes:

- **Skills and Processes**
  Students will be able to state the steps for making a peanut butter and jelly sandwich.

Grade/Level:

Grades 6-8

Duration/Length:

Six math classes, two language arts classes, and one science class

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating, fractions, decimals, and percents
- Writing skills

Student Outcomes:

Students will:

- construct a math board game.
- share their games with others.
- write to inform.

Materials/Resources/Printed Materials:

- Handouts/transparencies
- Scissors
- Rulers
- Markers/crayons
- Construction paper
- Glue
- Extra cardboard

Development/Procedures:

- **Day One in the Mathematics Classroom**
  Introduce the lesson with a discussion of their favorite board games. Ask students to share their favorite board games and why they like them. Encourage students to share their favorite sports, hobbies, or other pastimes. Announce to students that they will be creating their own board game. The game will include the following concepts and how they relate to each other: fractions, decimals, and percents.

  Students will form groups of 1-3 members. As a group, they will complete "Games, Games, Games Theme Worksheet" (Handout G-1). Set a 15 minute time limit. Class discussion of their examples.

- **Day One in the Science Classroom**
  Have students write directions for making a peanut butter and jelly sandwich. Set a 10 minute time limit. The teacher chooses a student and follows their directions for making the sandwich. Do the same for 3 or 4 students (allowing students to make changes in their directions).

  Have the class discuss the correct order for making the sandwich and then show the overhead of the correct order (Handout G-2). Engage students in a discussion of the importance of writing clear, orderly directions.

  Homework: Students are to bring in a set of directions.

- **Day Two in the Mathematics Classroom**
  The teacher will pass out the "Games, Games, Games Rubric" (Handout G-3) for the game and discuss it with the class. The students should then get into groups and are reminded of the worksheet that they did yesterday (Handout G-1). Then the group will write a rough draft of their game including the materials needed to create and play their game. The rough draft will be turned in at the end of the class.

  Homework: Students will bring in materials to create and play the game.

- **Day Two in the Language Arts Classroom**
  As an introduction, pass out an envelope with each step of a set of directions written on separate pieces of paper. The group will put the sentences in order. The teacher can use the sample provided along with other sets of directions (Handout G-4). Set a seven minute time limit. Discuss the correct order.

  Students should then get in their groups and share the directions that they have brought in. As a group they need to determine which one is written the best. Set a 20 minute time limit. Each group should share their best set of directions. If time allows, the groups should brainstorm ideas for directions for their game.

- **Days Three, Four, and Five in the Mathematics Classroom**
  Students will get into their groups and create their games.

  Homework: Finalize their game at home.

- **Days Three and Four in the Language Arts Classroom**
  Students will get in their groups and write the directions for their games. Set a 15 minute time limit. Groups will exchange their directions and critique each other. Set a 10 minute time limit. Groups will begin writing the final draft of their directions.

Homework: Finalize the set of directions. Teacher may need to collect to make final adjustments.

- **Day Six in the Mathematics Classroom**
  Students will play each others games and critique them (Handout G-5).

  Homework: Using the "Games, Games, Games Evaluation" (Handout G-5), students will make any final adjustments.

Performance Assessment:

The teacher will use "Games, Games, Games Rubric" to evaluate the games (Handout G-3).

Extension/Follow Up:

- The games could be given to another class to play and critique (Handout G-6).
- Students can fulfill Service-Learning hours by writing letters and donating games to places (hospitals, day care centers, schools) that could use them.

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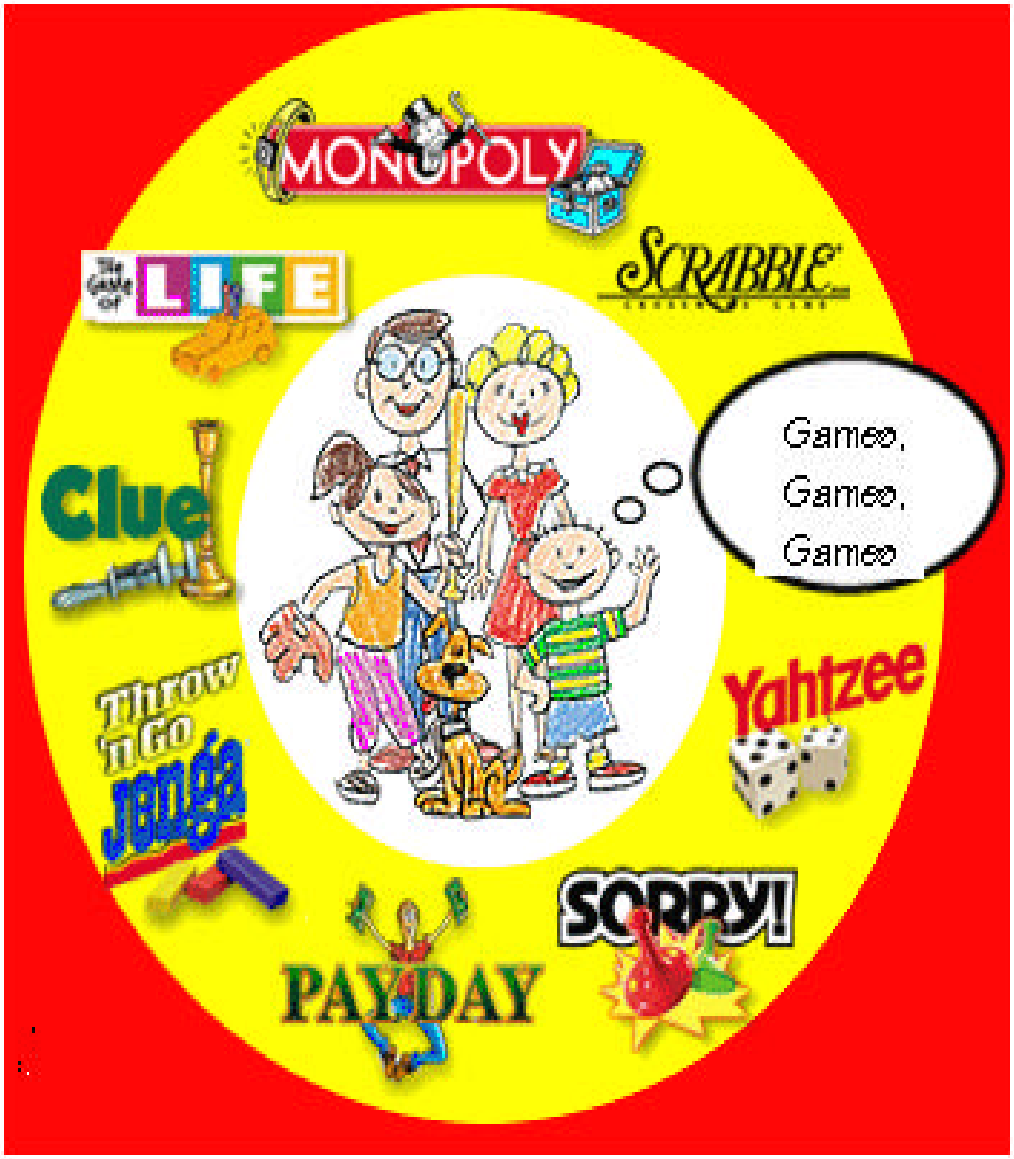
Games, Games, Games



Handout G-1

GAMES GAMES GAMES THEME WORKSHEET

Names:_____

DIRECTIONS:

The group should complete the form.
Decide on a theme for your board game and write the theme in the space below.
List some examples of questions that would relate to the theme for each math skill.

THEME: _____

FRACTIONS: _____

_____

_____

DECIMALS: _____

_____

_____

PERCENTS: _____

_____

_____

Bonus: On the back, show how to interrelate the skills with your theme in mind.

Procedure for Making a Peanut Butter and Jelly Sandwich

1. Obtain the following materials:
   peanut butter, jelly, a loaf of bread, a butter knife, counter space or cutting board, napkin.

2. Open the bread bag. Take out two slices of bread.

3. Place the slices of bread, separately, on the counter space or cutting board.

4. Open the jar of peanut butter. Using your butter knife, apply approximately one tablespoon of peanut butter to one piece of bread. Spread the peanut butter evenly all over the bread slice.

5. Open the jar of jelly. Using your butter knife, apply approximately one tablespoon of jelly to the plain slice of bread. Spread the jelly evenly all over the bread slice.

6. Place the jelly side of your bread face down on top of the peanut butter side.

7. Using your bread knife, cut your sandwich in half.

8. Eat and Enjoy!

9. Clean up all materials when finished.

Handout G-3

GAMES, GAMES, GAMES RUBRIC

• Game has clearly written directions. Game incorporates fractions, decimals, and percents and their interrelatedness. Game is attractive. Game includes all pieces needed to play.	4 points
• Game has clearly written directions. Game incorporates fractions, decimals, and percents but does not show interrelatedness. Game includes all pieces needed to play.	3 points
• Game directions are not clearly written. Game incorporates 2 of the 3 concepts (fractions, decimals, and percents). Game is missing playing pieces.	2 points
• Game directions are not clearly written. Game incorporates 1 of the 3 concepts (fractions, decimals, and percents). Game is missing playing pieces.	1 point
• Game has no directions. Game incorporates less than 3 of the concepts (fractions, decimals, and percents). Game is missing playing pieces.	0 points

Sample Directions

Cut all sentences and put into one envelope. Students then put the sentences in order (and hopefully realize that they have two sets of directions).

- Put each foot in
- Stand up
- Pull waist of pants over hips
- Zip and button

- Buy seeds
- Get pot, soil, and spade
- Put soil in the pot
- Mix fertilizer into potted soil
- Make a hole about two inches deep
- Place seeds in hole
- Cover hole and water

GAMES, GAMES, GAMES STUDENT EVALUATION

DIRECTIONS:
Circle the number of points that best evaluates this game.
Write additional comments at the bottom of the page.

- Game has clearly written directions. — 4 points
  Game incorporates fractions, decimals, and percents and their interrelationship.
  Game is attractive.
  Game includes all pieces needed to play.

- Game has clearly written directions. — 3 points
  Game incorporates fractions, decimals, and percents. but does not show interrelationship.
  Game includes all pieces needed to play.

- Game directions are not clearly written. — 2 points
  Game incorporates 2 of the 3 concepts (fractions, decimals, and percents).
  Game is missing playing pieces.

- Game directions are not clearly written. — 1 point
  Game incorporates 1 of the 3 concepts (fractions, decimals, and percents).
  Game is missing playing pieces.

- Game has no directions. — 0 points
  Game incorporates less than 3 of the concepts (fractions, decimals, and percents).
  Game is missing playing pieces.

ADDITIONAL COMMENTS:

Handout G-6

GAMES, GAMES, GAMES EVALUATION

Name of Game_____

_____Game directions were easy to follow.

_____Game directions were not easy to follow.

I would make the following changes in the game directions:

_____

_____

_____All pieces were included in game.

_____Some pieces were missing in game.

The following pieces need to be included in the game:

_____

_____

_____I enjoyed playing the game.

_____I did not enjoy playing the game.

Additional Comments:

_____

_____